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Research Article

Harmonal Variations in Rutual Period in Male Dromadaire (Camelus dromedarius) at Niono's Agronomic Research Station in Mali

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Abstract

Dromedary farming is one of the important strategies for adapting to climate change in Mali. Nevertheless, controlling dromedary reproduction is still a great challenge for its production enhancement. The present study, which aims to improve knowledge on the male dromedary reproduction physiology, was conducted on Niono Ranch Agronomic Research Station, from December 13, 2014 to February 06, 2015. It focused on 5 males including 1 adult aged 9-10 years and 4 peri-pubescent aged 4 to 5 years. Blood sample was taken in dry tubes after puncture of the jugular vein as follows: 1) in the dominant male, one sample per day in the absence of females in heat and three samples per day in the presence of females in heat were taken; 2) in the non-dominant males, blood sample was taken daily. Thus, 155 samples were collected from the 5 male dromedaries. Blood samples collected were site centrifuged and the serums obtained were kept in a thermoelectric cooler between 4 - 6°C and then transported for storage at -20°C. ELISA Sandwich method was applied to analyze blood samples using the testosterone specific luteinizing hormone (LH) kits.

Serum concentrations obtained were 40.17 ± 3.95pg / ml of testosterone and 2.48 ± 0.38 mIU/ml of LH in dominant males against 20.15 ± 1.84pg / ml of testosterone and 1.09 ± 0.18 mIU/ml LH in non-dominant males. Testosterone and LH variations experienced similar evolution in a saw tooth curve form. Hormonal concentration rate influences the fear and aggression reactions that govern social rank. This hormonal rate concentration increases during intense sexual activities both in the dominant and the non-dominant males who attend a mating. This study laid out foundations for the male dromedary management in a camels herd.

Keywords: Male Dromedary; Hormones; Reproduction; Testosterone; Lutein Hormone; Mali

Introduction

Dromedary farming is practiced by people throughout the northern part of Mali (Mali, 2013). The herd has been estimated at 978,980 heads (Mali, 2013). The Dromedary has a good ability to adapt harsh environments and values poor pastures in desert and semi-desert areas. This is why dromedary is a source of life for nomadic populations (Mukasa-Mugerwa, 1985).

Following the painful years of drought experienced by Mali in the late 1990s, the Institut d'Economie Rurale (IER) of Mali began its first dromedary research, focused on farming system diagnosis in the Gao region (Ouologuem et al., 2001).

The current study is a prelude to a series of research carried out to increase camel production. The reproduction of this species is slow because of its late entry into reproduction, a large interval between camels (ElWhishy, 1987), a long gestation period (Faye et al., 1997), etc.

One of the ways for improving dromedary production and productivity is mastering its reproduction physiology, in particular the hormonal profile and spawner behavior in a herd of female dromedaries.

For dromedaries breeding conditions in the Sahel in general and in Mali in particular, there is no information on hormonal reproductive profile in dromeda - ries. The present study, first in Mali, aimed to contribute to improving knowledge on male dromedary reproductive physiology, in particular its behavior during rutting and the main hormonal profiles that control it. It was carried out on dromedaries reared on Niono ranch in the Regional Center for Agronomic Research of Niono (CRRA / Niono) in the Sahelian zone of Mali.

Materials and Methods

Animal material

The material was composed of five males, including a dominant male (N35), aged 9 to 10 years, weighing 407 kg, another dominant male (N34), aged 5 to 6 years weighing 421.5 kg who reached sexual maturity and three younger (N19, N24 and N26) aged 4 to 5 years whose weights varied between 376 and 433 kg with no sexual maturity sign.

Photo (1): Male dromedary (N35) dominant in the herd at Niono (Photo Dolo, 2015)

Photo (2): Male dromedary (N17) not dominant in the herd at Niono (Photo Dolo, 2015)

Methods

Herd management

Male and female dromedaries were pastured together daily from 9 a.m. to 5 p.m. On their pasture return, they received an agro-industrial food supplement at the rate of 3 kg per animal. This supplement provided 2.43 forage Units (FU) of net energy and 363 g of digestible nitrogenous matter (MAD) per day and per animal .Water was given daily to the herd in the morning from a tank fed by a drilling powered by a solar pump. All camels were internally dewormed with albendazole and ivermectin and externally with vermectin and flumethrin, and vaccine -ated against pasteurellosis, symptomatic anthrax and anthrax.

Blood sampling and processing

Blood was taken in dry tubes after jugular vein puncture at specific periods during 55 days from December 13, 2014 to February 06, 2015 (Table 1). Blood samples were then site centrifuged at 3,600 rpm for 15 minutes; the serum obtained was kept in a thermoelectric cooler between 4 - 6°C and then stored at -20°C until the analysis phase in a laboratory.

Serological analysis

Serological analyzes were carried out using ELISA Sandwich quantitative "my Biosource" specific kits to camel and used to determine serum concentrations of luteinizing hormone (LH), glycoprotein and testosterone. The coloration was measured by spectrophotometry at 450nm wavelength. Hormone concentration in samples was determined by the "Gen5 ™"microplate data collection and analysis software. Means and standard error of the hormone concentrations will be calculated using the "Minitab 16" statistical software.

Results

Hormonal levels of dominant males in the presence of females in heat

Serum concentrations of the dominant male N35 were 42.34 ± 5.12 pg / ml for testosterone and 2.48 ± 0.41 mIU / ml for LH. Mean serum concentrations of the dominant male N34 were 18.06 ± 2.69pg / ml for testosterone and 2.55 ± 0.27 mIU / ml for LH. The minimum average hormone level in dominant males was 5.28 pg / ml for testosterone and 1.36 U / ml for LH. The maximum average was 96.09 pg / ml for testosterone and 10.25 U / ml for LH. Hormonal flow in dominant males in the presence of females in heat is indicated (Figure 1).

Serum concentrations in the second dominant male N34 were higher than those of the different heavier males. This explains why weight is not a criterion of dominance apart from the standard 350 kg adult live weight.

Rates in males vary widely from day to day and from a day period to the other.
sexes, the higher the male's ability to detect heat. Testosterone hormonal peak indicates female fertility mating period in the herd. This peak is observed in the dominant male N34 although it is isolated in another compartment. This variation in flow is the stress manifestation caused by the presence of the first male N35 which prevents any mating of another male in its presence. Rates vary depending on the male heat capacity and pheromone amount emitted by the male and the female. The higher the testosterone and pheromone levels of both

It is observed that during the 1st mating, the testosterone and LH concentration was low in the dominant males. This is explained at the first projetion/mating, manipulations on different males who were not yet used had influences on the hormones serum concentrations due to stress effect.

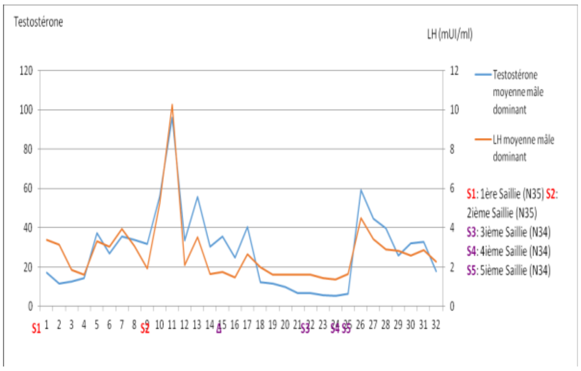
On the other hand, the second projection made by the dominant male N35, took place while the LH and testosterone concentrations were high in both the latter and the second dominant male N34. The N34 dominance start period appeared with a modest spike in its testosterone. Then, the LH and testosterone concentrations levels increased during the 3rd, 4th and 5th projection. This explains testosterone intervention during intense sexual activities.

In general, in males, testosterone and LH concentrations experienced almost similar evolution in the form of a serrated curve separated by more or less long intervals. One notes that the average serum concentration of dominant males (testosterone: 40.17 ± 3.95 pg / ml; LH: 2.48 ± 0.38 U / ml) is higher than that of nondominant males (testosterone: 20.15 ± 1.84 pg / ml; LH: 1.09 ± 0.18 U / ml).

Table (1): Summary of samples taken based on the male status

Male status	Sampling periods	Taps frequency per day	Number of taps per day	Number of days taken	Number of subjects sampled	Total taps
Dominants	In the presence of females in heat (before coitus and 5 days after coitus)	once every 8 hours	3 (morning, afternoon and night)	10	1	30
	In the absence of female in heat	1	1 (morning)	17	1	17
Non dominants		1	1 (morning)	27	4	108
Total						155

Figure (1): hormonal flow in dominant males in the presence of females in heat.

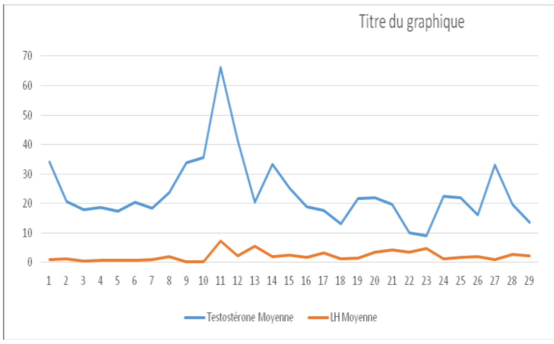


Hormonal levels of non-dominant males in the presence of females in heat

Mean serum concentrations of the non-dominant male N26 were 39.36 ± 2.73pg / ml for testosterone and 0.02 ± 0.1 mIU/ml for LH. Mean serum concentrations of the non-dominant male N24 were 14.74 ± 3.73pg/ml for testosterone and 2.42 ± 0.36 mIU / ml for LH. Mean non-dominant male N19 serum concentrations were 14.99 ± 1.67 pg / ml for testosterone and 0.66 ± 0.23 mIU / ml for LH. Hormonal flow of non-dominant males in the presence of females in heat is shown (Figure 2).

In non-dominant males, testosterone levels were below the positive threshold in N19 and N26 which have not yet mated females (P <0.000). Only the male N24 presented positive LH hormonal fluxes in the presence of females in heat when the dominant males are distant or distracted (9.229 U / ml). In the latter the hormonal flow evolves in the same way as in the dominant males (mating S2; S3; S4; S5). This indicates his predisposition to replace the two dominant males. During the 2nd and 3rd mating, LH and testosterone concentrations levels were high in the different non-dominant males. This phenomenon highlighted the existence of a set of sexual impulses felt by non-dominant males when they witness a mating.

Figure (2): hormonal flow in non-dominant males in the presence of females in heat.



Discussion

Two authors (Coget, 2008; Gayrard, 2007) justify the saw tooth evolution by the fact that LH is released in a pulsatile manner, and the secretion of testosterone obeys at the same rate. These results in brief episodes of intense release, separated by more or less long intervals, vary over the course of the day and can reach several hours.

Findings show that androgen hormone concentration level is a very important parameter influencing males dominance character. This observation confirms these researchers' findings (Pasha et al., 2015; Yagil and Etzion, 1980; Deen et al., 2005).

Results obtained on testosterone flow are similar to those of Deen et al. (2005). Current findings are comparable to those of (Whirledge and Cidlowski, 2010 and Al-Damegh, 2014) who claim that stress induces an excessive secretion of gluc ocorticoids which affects gonadal function at different levels of the hypothalamic-pituitary axis-gonadic (decreases the synthesis and release of GnRH, inhibits the synthesis and release of LH and FSH and modulates steroidogenesis and / or gametogenesis).

The correlation between sexual libido and the hormonal profile (testosterone and estradiol) would be a possibility that remains to be scientifically proven in dromedary alongside with the writings of Deen et al. (2005). On the other hand, these results showed hormonal concentrations significantly below those obtained by other researchers. Thus, in Egypt, Rateb et al. (2011) obtained 1.7 ± 0.2 ng / ml in sub-fertile dromedaries and 3.7 ± 0.2 ng / ml in fertile dromedaries by Enzyme Immuno Assay (EIA).

In Egypt, El-Kon et al. (2011) reported serum concentrations of 7.88 ± 1.72 ng / ml testosterone in males 4-6 years of age and 14.52 ± 2.12 ng / ml testosterone in males 8-10 years of age by radioimmunoassay (RIA).

In Saudi Arabia, the work of Al-Saiady et al. (2015) made it possible to obtain from pre-pubescent dromedaries (3 years old), in winter (rutting periods) 1.63 ± 0.37 ng / ml of testosterone and 1.43 ± 0.29 IU / l of LH by assaying the serum concentrations with the ELISA Diagnostic Automation Inc. CA kit.

In Pakistan, Pasha et al. (2015) obtained in mature dromedaries (6-9 years) 8.29 ± 0.54 - 15.51 ± 1.15 ng / ml of serum testosterone in winter (periods of rut).

The big difference between the serum concentrations of this study and those obtained by different researchers could be explained by:

- the use of a hormonal assay method using an ELISA kit specific to Camelus genus whose performance (detection ranges) did not allow the various values reported by these authors to be obtained;
- other adaptive factors include such as a genetic, diet, rainfall and temperature, factors. The positive correlation between low ambient temperatures and high plasma testosterone concentrations has been established by Deen et al. (2005). The results of the researchers (Al-Saiady et al., 2015, 2013; Rateb et al., 2011; El-Bahrawy and El-Hassanein, 2011) were different because of the above factors.

Conclusion

This study generated novel knowledge on the hormonal profile of male dromedaries in the presence of females in heat in the Sahelian zone of Mali.

Dominant male higher hormones concentration confirms the existence of a hierarchy between males in the herd. This new knowledge will pave the road for better male management in order to avoid confrontations between them. In addition, knowledge of the pulsatile nature of the concentration of hormones is an important criterion for the collection of sperm for higher rate of fertilization in an artificial insemination program. However, research activities should continue reprodu ctive hormone profiles during the year in order to ascertain the seasonality of reproduction in different agro-ecological zones.

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